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Procedia - Social and Behavioral Sciences 197 (2015) 1672 – 1678

Procedia
Social and Behavioral Sciences

7th World Conference on Educational Sciences, (WCES-2015), 05-07 February 2015, Novotel Athens Convention Center, Athens, Greece

Peculiarities of Interactive Whiteboard Application during Lessons in Lithuanian General Education Schools

Brigita Vainoryte[a]*, Birute Zygaitiene[a]

[a]*Lithuanian University of Educational Sciences, Studentu g. 39, LT-08106 Vilnius, Lithuania*

Abstract

The research aims to identify the peculiarities of using interactive whiteboards (IWB) in 5th-6th and 9th-10th forms in Lithuanian general education schools. The research was carried out in the school year of 2013–2014 and the data were obtained from the survey of 25 heads of school, 76 teachers and 116 school learners. The data acquired during the survey allowed to identify the most frequent advantages of using IWB as well as the related problems and impact of this teaching and learning tool.

Peer-review under responsibility of Academic World Education and Research Center.

Keywords: interactive whiteboard; advantages of using interactive whiteboards; impact of interactive whiteboards

1. Introduction

Over the last decade an interactive whiteboard (IWB) has become a popular means of teaching and learning all over the world. The final report of the European Commission of 2013 states that IWBs are spread in all European schools at different levels (with the proportion of 100 learners per whiteboard). IWB are most popular in Norway (36 learners per IWB) and Spain (43 learners per IWB). The lowest popularity of IWB is observed in schools of Greece, Turkey, Luxembourg, Croatia, Bulgaria and Romania (500-1000 learners per IWB). The situation in Lithuania is similar to France: 250 learners per IWB (European Commission DG Communications Networks, Content & Technology, 2013). The forecast of Futuresource Consulting (2013) reveals that such screen technologies as tablets, interactive projectors and whiteboards will have reached 1050000 by the year 2017. The latest studies

* Brigita Vainoryte. Tel.: +370 6234 2672
E-mail address: brigita.vainoryte@leu.lt

Peer-review under responsibility of Academic World Education and Research Center.
doi:10.1016/j.sbspro.2015.07.218

demonstrate that the prospective investments in the infrastructure of education will be further focused on IWB (Yudt and Columba, 2011).

In their works Hall and Higgins (2005), Smith, Hardman and Higgins (2006), Amolo and Dees (2007), Wood and Ashfield (2008), Somyurek, Atasoy and Ozderim (2009), Paragina, Paragina and Jipa (2010), Gursul and Tozmaz (2010), Northcote, Mildenhall, Marshall and Swan (2010), Aytekin, Fahad AbdulAziz, Hisham Barakat and Mohammed Abdelrahman (2012), Turel and Johnson (2012) focus on the advantages, problems and impact of using IWB in the process of education. However, no comprehensive studies have been carried out so far that would analyse the aforesaid processes in schools of general education in Lithuania. Therefore, the current study aims at evaluating the peculiarities of using interactive whiteboards (IWB) in 5th-6th and 9th-10th forms in Lithuanian general education schools.

2. Method

The research was carried out in Lithuanian schools of general education in the school year of 2013–2014. The conducted analysis of scientific literature and documents enabled us to design questionnaire forms for heads of schools, teachers and school learners. The questionnaire survey was used to identify the attitude of school heads, teachers and school students towards peculiarities of applying IWB during lessons in 5th-6th and 9th-10th forms. The electronic questionnaires were employed in the research and the respondents received the forms electronically. The empiric research data were processed applying statistical analysis of the research data, graphic analysis as well as correlation analysis.

3. Participants

The sample of the research included 25 heads of schools (72 % women and 28 % men), 76 teachers (84 % women and 16 % men) and 116 school students (61 % girls and 39 % boys). 9th formers (31 %) and 10th formers (34 %) prevailed in the sample and 9 % of 5th formers and 25 % of 6th formers participated in the survey.

4. Findings

4.1. The results of the analysis of the respondents' attitude towards the advantages of using IWB

The attitude of school heads, teachers and school students towards application of IWB during lessons in 5th-6th and 9th-10th forms resulted in identification of the most frequent advantages of employing IWB in the classroom. Table 1 presents the data, which reveal three main advantages of IWB use pointed out by school heads and teachers: 1) IWB application provides teachers with the majority of multimedia resources (strongly agree: 64 % of school heads and 51 % of teachers), 2) IWB facilitates familiarisation with the new technologies and their application (strongly agree: 60 % of school heads and 57 % of teachers), 3) IWB provides more opportunities to teach learners new things (strongly agree: 52 % of school heads and 58 % of teachers). The statement that IWB application helps to introduce and apply new technologies was much more positively evaluated by 26–30 year old heads of school (100 %) than by elderly teachers ($X^2 = 29.481$; df = 8; p = 0.000; p < 0.0001). Therefore, it can be concluded that younger heads of school tend to show more favourable attitude towards the use of information technologies at school.

Table 1. The opinion of school heads and teachers about advantages of IWB application

	Strongly agree (%)		Agree (%)		No opinion (%)		Disagree (%)		Strongly disagree (%)	
	SH*	T*	SH*	T*	SH*	T*	SH*	T*	SH*	T*
IWB provide teachers with more opportunities to teach students new things	52	58	48	36		4		3		
Use of IWB gives access to the majority of multimedia resources	64	51	32	45		4	4			

Use of IWB provides teachers with more time for communication with their learners	24	18	36	37	12	25	28	18	1
IWB help teachers to teach easier and more efficiently	36	32	40	50	20	12	4	7	
Use of IWB enables teachers to better concentrate on their teaching	24	24	52	43	16	28	8	5	
Use of IWB enables teachers to familiarise with and apply the new technologies	60	57	36	39	4	4			
Use of IWB enables teachers to share teaching materials with their colleagues	32	39	28	45	28	13	12	3	

*SH – school heads, T – teachers

The analysis of attitudes of school heads and teachers towards advantages of IWB use revealed a number of correlation links. The responses of heads of schools disclosed a strong correlation between the statements that use of IWB provides teachers with more opportunities to teach new things and that this teaching and learning tool gives access to the majority of multimedia resources ($\rho = 0.614$; $p < 0.001$). On the other hand, the correlation between these statements in the teachers' responses is significant ($\rho = 0.48$; $p < 0.0001$). The heads of school, who pointed out that IWBs provide teachers with more time for communication with their learners, also more frequently mentioned that IWBs help teachers to teach easier and more efficiently ($\rho = 0.628$; $p < 0.001$) and enable them to share teaching materials with their colleagues ($\rho = 0.638$; $p < 0.001$). The significant relation was identified between the latter statement and the statement that IWBs enable teachers to familiarise with and apply the new technologies ($\rho = 0.521$; $p < 0.01$). The responses of teachers showed that IWBs help them to teach easier and more efficiently because while using this teaching tool teachers are able to better concentrate on their teaching ($\rho = 0.601$; $p < 0.0001$), use of IWB enables teachers to familiarise with and apply the new technologies ($\rho = 0.561$; $p < 0.0001$), IWBs also contribute to easier sharing of teaching materials with colleagues ($\rho = 0.507$; $p < 0.0001$).

Following the opinion of school students (Table 2), three main advantages of IWB application are distinguished: 1) IWBs enable them to familiarise with and apply the new technologies (strongly agree: 43 % of school learners), 2) IWBs give access to the majority of multimedia resources (strongly agree: 43 % of school learners), 3) use of IWB provides more opportunities to learn new things (strongly agree: 37 % of school learners).

Table 2. School students' opinion about advantages of IWB

	Strongly agree (%)	Agree (%)	No opinion (%)	Disagree (%)	Strongly disagree (%)
Use of IWB provides more opportunities to learn new things	37	50	9	4	
Use of IWB gives access to the majority of multimedia resources	43	45	9	3	
Use of IWB provides teachers with more time for communication with their learners	15	34	33	14	5
IWB help me to learn easier and more efficiently	29	47	14	8	2
Use of IWB enables teachers to better concentrate on their teaching of students	19	47	24	9	1
Use of IWB enables me to familiarise with and apply the new technologies	43	43	9	3	2
Use of IWB enables teachers to share teaching materials with their friends	35	47	16	1	1

As it can be seen from the data above, school heads, teachers and school students pointed out the same advantages of IWBs in the process of education.

The analysis of the responses of learners according to form and gender disclosed the following: 9th-10th formers (71 %) more frequently stated that using IWB teachers are able to better concentrate on teaching of learners ($X^2 = 6.024$; $df = 2$; $p = 0.049$; $p < 0.05$) compared to 5th-6th formers (55 %), whereas girls more frequently (93 %) than boys (78 %) agreed with the statement that IWB provide with a possibility of learning new things ($X^2 = 6.199$; $df = 2$; $p = 0.045$; $p < 0.05$).

4.2. The results of analysis of the respondents' attitude towards use of IWB

On the basis of the data in Table 3. three main problems, which are faced by school heads and teachers applying IWB, may be singled out: 1) use of IWB during lessons requires serious preparation from teachers outside the classroom (strongly agree: 32 % of school heads, 22 % of teachers; agree: 44 % of school heads and 42 % of teachers), 2) teachers have to develop methodological material for work on IWB themselves (strongly agree: 28 % of school heads, 21 % of teachers; agree: 48 % of school heads and 41 % of teachers); 3) use of IWB is very expensive (schools do not have funds to acquire IWB) (strongly agree: 20 % of school heads, 20 % of teachers; agree: 40 % of school heads and 37 % of teachers). The statement that use of IWB during lessons requires serious preparation from teachers outside the classroom was strongly supported by more female teachers (25 %) than male ones (8 %) ($X^2 = 12.532$; $df = 4$; $p = 0.014$; $p < 0.05$).

Table 3. Attitude of school heads and teachers on problems encountered using IWB

	Strongly agree (%)		Agree (%)		No opinion (%)		Disagree (%)		Strongly disagree (%)	
	SH*	T*	SH*	T*	SH*	T*	SH*	T*	SH*	T*
Use of IWB limits movement of learners in the classroom	8	7	24	24	12	33	48	30	8	7
Use of IWB is complicated as a new model of education is needed	8	9	24	34	16	13	36	36	16	8
Use of IWB is very expensive (schools do not have funds to acquire IWB)	20	20	40	37	8	25	20	17	12	1
Use of IWB requires extensive teaching experience	8	12	32	32	8	9	40	43	12	4
Teachers are tired of using technologies in the classroom		5	4	9	24	13	56	50	16	22
Use of IWB during lessons requires serious preparation from teachers outside the classroom	32	22	44	42	4	8	8	25	12	3
No internet access or weak connection in the classrooms, where IWB is installed		3	8	12	16	32	40	37	36	17
Schools do not update packages of IWB software	8	8	12	18	20	36	48	28	12	11
Teachers have to develop methodological material for work on IWB themselves	28	21	48	41	12	25	4	12	8	1
Unavailability of methodological material and aids in Lithuanian for work on IWB during lessons of different study subjects	16	11	36	25	12	32	24	28	12	5

*SH – school heads, T – teachers

The correlation analysis disclosed that according to school heads, use of IWB is complicated as a new model of education is needed, therefore, IWB requires extensive teaching experience ($\rho = 0.7$; $p < 0.0001$) and teachers are tired of using technologies in the classroom ($\rho = 0.505$; $p < 0.0001$). The respondents, who indicated that teachers are tired of using technologies in the classroom, also stated that use of IWB during lessons requires serious preparation from teachers outside the classroom ($\rho = 0.543$; $p < 0.005$). The school heads, who more frequently agreed with the last statement, also indicated that teachers have to develop methodological material for work on IWB themselves ($\rho = 0.417$; $p < 0.05$) and that methodological material and aids in Lithuanian for work on IWB during lessons of different study subjects are unavailable ($\rho = 0.555$; $p < 0.001$). The teachers, who stated that use of IWB is complicated as a new model of education is needed, more frequently agreed with the statements that application of IWB requires extensive teaching experience ($\rho = 0.666$; $p < 0.0001$), that teachers are tired of using technologies in the classroom ($\rho = 0.520$; $p < 0.0001$) and that employment of IWB during lessons requires serious preparation from teachers outside the classroom ($\rho = 0.436$; $p < 0.0001$).

After the analysis of the learners' responses, it can be stated that the majority of school learners pointed out absolutely different problems related to application of IWB compared to school heads and teachers. The school students see the following most serious problems: 1) application of IWB limits movement of learners in the classroom (strongly agree: 19 %, agree: 22 % of school students), 2) application of IWB is complicated as it

requires IT knowledge (strongly agree: 10 %, agree: 21 % of school students), 3) teachers do not want to use IWB during their lessons (strongly agree: 15 %, agree: 16 % of school students). The responses of school students according to form showed that 5th-6th formers (50 %) agreed with the statement that use of IWB limits movement of learners in the classroom more frequently than 9th-10th formers (36 %) ($X^2 = 8.036$; $df = 2$; $p = 0.018$; $p < 0.05$).

4.3. The results of analysis of respondents' attitude towards impact of IWB use

The data presented in Table 4 show that according to the opinion of school heads, use of IWB in lessons develops the following abilities of learners: information skills (76 %), motivation to learn (64 %) and creativity (60 %). Teachers and their students mostly agree with the statement that employment of IWB develops information skills (87 % of teachers, 59 % of school students), technical skills (68 % of teachers, 53 % of school students) and creativity (54 % of teachers, 45 % of school students). The school students (45 %) also single out the enhanced activity and involvement.

Table 4. Development of school students' abilities using IWB

	Abilities are developed (%)			Abilities are partially developed (%)			No influence on ability development (%)		
	SH*	T*	SS*	SH	T	SS	SH	T	SS
Critical thinking	20	41	22	68	46	49	12	13	29
Communication	56	43	22	36	43	49	8	13	28
Motivation to learn	64	53	40	28	38	40	8	9	21
Creativity	60	54	45	32	39	36	8	7	19
Information skills	76	87	59	20	12	29	4	1	12
Technical skills	56	68	53	36	25	30	8	7	16
Collaboration	24	22	29	52	61	43	24	17	28
Activity	52	49	45	36	38	34	12	13	22

*SH – school heads, T – teachers, SS – school students

The process of the responses of school students acceding to their gender disclosed a number of differences: girls (49 %) more frequently compared to boys (24 %) pointed out that IWBs strengthen their motivation to learn ($X^2 = 7.140$; $df = 2$; $p = 0.028$; $p < 0.05$); girls (69 %) more frequently than boys (42 %) stated that application of IWB contributes to improvement of their information skills ($X^2 = 8.295$; $df = 2$; $p = 0.016$; $p < 0.05$). Compared to boys (29 %), more girls in the research (55 %) mentioned that this learning tool enhances their activity and involvement ($X^2 = 10.938$; $df = 2$; $p = 0.004$; $p < 0.01$).

The analysis of correlation showed that heads of schools, who agree with the statement that IWB develop information skills, also mentioned that this teaching and learning tool contributes to development of communication ($\rho = 0.624$; $p < 0.001$), motivation to learn ($\rho = 0.555$; $p < 0.01$) and creativity ($\rho = 0.670$; $p < 0.0001$). No such correlation was identified in the responses of teachers.

The question "*In what forms is the potential of IWB application revealed best?"* aimed to identify the attitude of teachers towards possibilities of IWB use in separate concentres. According to the teachers, IWB may be most efficient in lessons of 5th-6th forms (37 % - highly efficient, 38 % - efficient); they may be slightly less efficient in 7^{th}–8^{th} forms (34 % - highly efficient, 38 % efficient), in 9th-10th forms (25 % - highly efficient, 37 % - efficient) and in 1st–4th forms (28 % - highly efficient, 28 % - efficient). The use of IWB is said to be least efficient in 11th–12th forms (20 % - highly efficient, 30 % - efficient).

According to the heads of schools, IWB may always be used during lessons of informatics (64 %), mathematics (44 %), physics (32 %), biology (32 %), foreign languages (32 %) and chemistry (28 %). The opinion of teachers and heads of schools were almost the same; therefore, it can be concluded that IWBs are most frequently used in lessons of natural sciences and foreign languages.

5. Discussion

The majority of researchers, who analyse impact of IWB on the learning process, emphasise increasing learning motivation of school students. Amolo and Dees (2007) stated that school students were absolutely fascinated by use of IWB. The learners were more concentrated and highly motivated to learn. The improvement of their achievements was statistically significant compared to learners, who worked without IWB in the classroom. The majority of the respondents mentioned the potential of IWB to encourage students' autonomy and to serve as a catalyser in interaction with other students and resources (Northcote, Mildenhall, Marshall, Swan, 2010). The research conducted by Smith, Hardman and Higgins (2006) revealed that teachers evoke their learners' interest in learning activities more frequently using IWB compared with those, who do not use this teaching and learning tool. Teachers employing IWB in their lessons more frequently monitored students' learning by asking higher level questions compared to those without IWB. The case study conducted by Wood and Ashfield (2008) revealed that use of IWB enhanced teaching and learning of the whole class. The research revealed that the functions of this tool enable access to resources of better quality, to recording of lessons or increase in speed of lesson material presentation. The results of the qualitative research carried out by Aytekin, Fahad AbdulAziz, Hisham Barakat and Mohammed Abdelrahman (2012) showed that the school learners most frequently singled out the following advantages of IWB use: increase in learners' motivation and improved attendance, IWB facilitate memorisation of information.

Turel and Johnson (2012) identified the advantages of IWB use, which are similar to the ones in our study: application of IWB strengthens school students' interest in themes of lessons (agree: 75 % of teachers, the current study: 77 % of teachers), students look forward to using of IWB during their lessons (agree: 32 % of teachers, the current study: 69 % of teachers), students' concentration strengthens during lessons, where IWBs are employed (agree: 64 % of teachers, the current study: 58 % of teachers) and employment of IWB increases students' motivation to learn (agree: 70 % of teachers, the current study: 63 % of teachers). The research also revealed that IWB facilitate visual presentation of the teaching materials (agree: 92 % of teachers, the current study: 77 % of teachers), teachers like working with IWB (agree: 70 % of teachers, the current study: 65 % of teachers). Using IWB in their work, teacher feel more prepared for lessons (agree: 68 % of teachers, the current study: 54 % of teachers). The improvement of teachers' skills of using IWB is observed (agree: 76 % of teachers, the current study: 63 % of teachers). Training how to use IWB is very important (agree: 81 % of teachers, the current study: 69 % of teachers) and IWBs make lessons more pleasant (agree: 67 % of teachers, the current study: 59 % of teachers).

Paragina, Paragina and Jipa (2010) carried out the research, which demonstrated that employment of IWB improves learning of school students, who prevailing visual or practical memory. The interactive whiteboard has the following advantages: the whole content of a lesson may be easier taught, good access to the Internet at any moment of a lesson in the classroom, learning skills of all the learners in the class are enhanced, computer literacy is improved and attention of both teachers and their students strengthens. Following teachers' opinion, Gursul and Tozmaz (2010) revealed the following strengths of using IWB: attention of school learners is attracted using visual materials (40 %), students are provided with opportunities of active involvement in lessons (22 %), retention of learning (12 %), possibility of storing what is explained during a lesson and using it next time (10 %), turning lessons into joyful experience (10 %) and easier teaching (7 %). The researchers also pointed out the problems most frequently encountered using this teaching and learning tool: technical problems (69 %), long preparation for lessons (26 %) and lessons require materials prepared in advance (5 %). Somyurek, Atasoy and Ozderim (2009) conducted the survey, where more than half of the teachers pointed out that they do not have methodological materials to work with IWB. According to I. Hall and S. Higgins (2005), IWBs have numerous advantages but lack of methodological materials is also observed. The data of our research showed the same key problems faced by heads of schools and teaches while using IWBs. Firstly, use of IWB in the classroom requires strong preparation from teachers outside it (strongly agree: 32 % heads of schools, 22 % of teachers; agree: 44 % heads of school and 42 % of teachers). Secondly, teachers have to develop methodological materials for working with IWB (strongly agree 28 % heads of schools and 21 % of teachers; agree: 48 % heads of schools and 41 % of teachers).

6. Conclusion

The empiric research revealed that according to the opinion of the majority of school heads and teachers, use of IWB increases school students' interest in the themes of lessons and thus, strengthens their motivation to learn. That is why, the heads of schools make attempts to upgrade schools' learning facilities with IWB. This learning tool is most frequently used in lessons of science and foreign languages. The opinions of school heads and learners did not reveal any significant difference in applying IWB in 5th–6th and 9th–10th forms. However, teachers think that IWB may be applied in lessons of 5th–6th forms most efficiently (37 % highly efficiently, 38 % efficiently). The quantitative research revealed that the biggest advantages of IWB use are as follows: this teaching/learning tool provides teachers with access to multimedia resources (strongly agree: 64 % of school heads and 51 % of teachers), helps to familiarise with and employ the new technologies (strongly agree: 60 % of school heads and 57 % of teachers) and provides more opportunities for teachers to teach school learners new things (strongly agree: 52 % of school heads and 58 % of teachers). The most serious problems encountered by schools while applying IWB include the following: use of IWB during lessons requires from teachers preparation outside the classroom (strongly agree: 32 % of school heads and 22 % of teachers; agree: 44 % of school heads and 42 % of teachers) and teachers have to develop methodological materials for IWB themselves (strongly agree: 28 % of school heads and 21 % of teachers; agree: 48 % of school heads and 41 % of teachers).

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